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CRYPTOCURRENCY AND EFFICIENT MARKET HYPOTHESIS. DRUNKEN RISIBILITY.

ECONOFICTION BITCOIN, CRYPTOCURRENCY, FINANCE, RISK

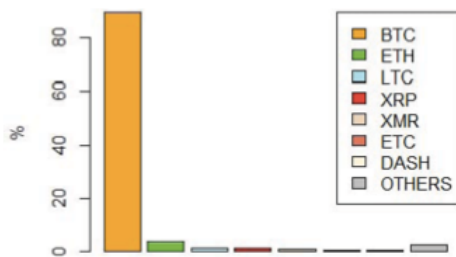
According to the traditional definition, a currency has three main properties: (i) it serves as a medium of exchange, (ii) it is used as a unit of account and (iii) it allows to store value. Along economic history, monies were related to political power. In the beginning, coins were minted in precious metals. Therefore, the value of a coin was intrinsically determined by the value of the metal itself. Later, money was printed in paper bank notes, but its value was linked somewhat to a quantity in gold, guarded in the vault of a central bank. Nation states have been using their political power to regulate the use of currencies and impose one currency (usually the one issued by the same nation state) as legal tender for obligations within their territory. In the twentieth century, a major change took place: abandoning gold standard. The detachment of the currencies (specially the US dollar) from the gold standard meant a recognition that the value of a currency (specially in a world of **fractional banking**) was not related to its content or representation in gold, but to a broader concept as the confidence in the economy in which such currency is based. In this moment, the value of a currency reflects the best judgment about the monetary policy and the “health” of its economy.

In recent years, a new type of currency, a synthetic one, emerged. We name this new type as “synthetic” because it is not the decision of a nation state, nor represents any underlying asset or tangible wealth source. It appears as a new tradable asset resulting from a private agreement and facilitated by the anonymity of internet. Among this synthetic currencies, Bitcoin (BTC) emerges as the most important one, with a market capitalization of a few hundred million short of \$80 billions.



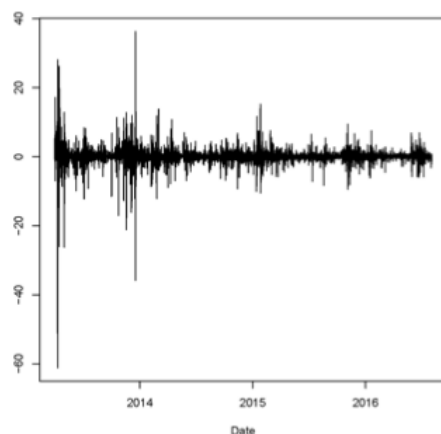
Bitcoin Price Chart from Bitstamp

There are other cryptocurrencies, based on blockchain technology, such as Litecoin (LTC), Ethereum (ETH), Ripple (XRP). The website <https://coinmarketcap.com/currencies/> counts up to 641 of such monies. However, as we can observe in the figure below, Bitcoin represents 89% of the capitalization of the market of all cryptocurrencies.



Cryptocurrencies. Share of market capitalization of each currency.

One open question today is if Bitcoin is in fact a, or may be considered as a, currency. Until now, we cannot observe that Bitcoin fulfills the main properties of a standard currency. It is barely (though increasingly so!) accepted as a medium of exchange (e.g. to buy some products online), it is not used as unit of account (there are no financial statements valued in Bitcoins), and we can hardly believe that, given the great swings in price, anyone can consider Bitcoin as a suitable option to store value. Given these characteristics, Bitcoin could fit as an ideal asset for speculative purposes. There is no underlying asset to relate its value to and there is an open platform to operate round the clock.



Bitcoin returns, sampled every 5 hours.

Speculation has a long history and it seems inherent to capitalism. One common feature of speculative assets in history has been the difficulty in valuation. **Tulipmania**, the **South Sea bubble**, and more others, reflect on one side human greedy behavior, and on the other side, the difficulty to set an objective value to an asset. All speculative behaviors were reflected in a super-exponential growth of the time series.

Cryptocurrencies can be seen as the libertarian response to central bank failure to manage financial crises, as the one occurred in 2008. Also cryptocurrencies can bypass national restrictions to international transfers, probably at a cheaper cost. Bitcoin was created by a person or group of persons under the pseudonym Satoshi Nakamoto. The discussion of Bitcoin has several perspectives. The computer science perspective deals with the strengths and weaknesses of blockchain technology. In fact, according to **R. Ali et. al.**, the introduction of a "distributed ledger" is the key innovation. Traditional means of payments (e.g. a credit card), rely on a central clearing house that validate operations, acting as "middleman" between buyer and seller. On contrary, the payment validation system of Bitcoin is decentralized. There is a growing army of miners, who put their computer power at disposal of the network, validating transactions by gathering together blocks, adding them to the ledger and forming a 'block chain'. This work is remunerated by giving the miners Bitcoins, what makes (until now) the validating costs cheaper than in a centralized system. The validation is made by solving some kind of algorithm. With the time solving the algorithm becomes harder, since the whole ledger must be validated. Consequently it takes more time to solve it. Contrary to traditional currencies, the total number of Bitcoins to be issued is beforehand fixed: 21 million. In fact, the issuance rate of Bitcoins is expected to diminish over time. According to **Laursen and Kyed**, validating the public ledger was initially rewarded with 50 Bitcoins, but the protocol foresaw halving this quantity every four years. At the current pace, the maximum number of Bitcoins will be reached in 2140. Taking into account the decentralized character, Bitcoin transactions seem secure. All transactions are recorded in several computer servers around the world. In order to commit fraud, a person should change and validate (simultaneously) several ledgers, which is almost impossible. Additional, ledgers are public, with encrypted identities of parties, making transactions "**pseudonymous, not anonymous**". The legal perspective of Bitcoin is fuzzy. Bitcoin is not issued, nor endorsed by a nation state. It is not an illegal substance. As such, its transaction is not regulated.

In particular, given the nonexistence of saving accounts in Bitcoin, and consequently the absense of a Bitcoin interest rate, precludes the idea of studying the price behavior in relation with cash flows generated by Bitcoins. As a consequence, the underlying dynamics of the price signal, finds the Efficient Market Hypothesis as a theoretical framework. The Efficient Market Hypothesis (EMH) is the cornerstone of financial economics. One of the seminal works on the stochastic dynamics of speculative prices is due to **L Bachelier**, who in his doctoral thesis developed the first mathematical model concerning the behavior of stock prices. The systematic study of informational efficiency begun in the 1960s, when financial economics was born as a new area within economics. The classical definition due to Eugene Fama (**Foundations of Finance_ Portfolio Decisions and Securities Prices 1976–06**) says that a market is informationally efficient if it "fully reflects all available information". Therefore, the key element in assessing efficiency is to determine the appropriate set of information that impels prices. Following **Efficient Capital Markets**, informational efficiency can be divided into three categories: (i) weak efficiency, if prices reflect the information contained in the past series of prices, (ii) semi-strong efficiency, if prices reflect all public information and (iii) strong efficiency, if prices reflect all public and private information. As a corollary of the EMH, one cannot accept the presence of long memory in financial time series, since its existence would allow a riskless profitable trading strategy. If markets are informationally efficient, arbitrage prevent the possibility of such strategies. If we consider the financial market as a dynamical structure, short term memory can exist (to some extent) without contradicting the EMH. In fact, the presence of some mispriced assets is the necessary stimulus for individuals to trade and reach an (almost) arbitrage free situation. However, the presence of long range memory is at odds with the EMH, because it would allow stable trading rules to beat the market.

The presence of long range dependence in financial time series generates a vivid debate. Whereas the presence of short term memory can stimulate investors to exploit small extra returns, making them disappear, long range correlations poses a challenge to the established financial model. As recognized by **Ciaian et. al.**, Bitcoin price is not driven by macro-financial indicators. Consequently a detailed analysis of the underlying dynamics (Hurst exponent) becomes important to understand its emerging behavior. There are several methods (both parametric and non parametric) to calculate the **Hurst exponent**, which become a mandatory framework to tackle BTC trading.

taken from here

Fotot: Bernhard Weber

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